

4.0 Public Page

Over the last five years, automated ultrasonic testing (AUT) has been used increasingly in cross-country and offshore pipeline construction to improve defect detection and sizing reliability. However, even with advanced AUT methods, there are still uncertainties in defect detection and sizing using the current zonal discrimination and amplitude-based approach. In order to reliably apply fitness-for-purpose based design and construction methods for both current and next generation high strength, high-pressure, cross-country and offshore pipelines there is a need to define the performance and limitations of current AUT methods and develop improved multi-probe AUT and phased-array (PA) AUT systems to detect, locate, and size flaws and to resolve distance between potentially interacting defects.

Working in collaboration with TransCanada Pipeline (TCPL), Pipeline Research Council International (PRCI), and ConocoPhillips, Edison Welding Institute (EWI) is leading a project funded by the U.S. Department of Transportation's Research and Special Programs Administration to extend recent studies to determine the limits of AUT for cross-country gas transmission pipelines to include an evaluation of PA AUT, as well as, assessing the performance of AUT and PA AUT systems for high strength / high pressure pipelines.

The project comprises the following tasks:

1. Review of Current Industry NDE Requirements and AUT Procedures
2. Define Capabilities and Limitations of Current AUT Technology
3. Develop Improved 3-D Imaging and Time Based PA Approach
4. UT Modeling and Simulation
5. Round Robin NDE Trials
6. Field Trials of AUT and Phased-Array AUT Capabilities
7. Develop Recommendations and Guidance on PA AUT
8. Technology Demonstration and Commercialization

An improved time-based, data fusion inspection method for assessment of pipeline girth welds and repair welds has been developed and validated. Detection limits and defect-sizing accuracy of multi-probe AUT and PA UT methods were tested and validated with a combination of experimental testing and comprehensive UT modeling and simulation tools. Code has been developed for improved 3-D imaging and time-based PA. Field testing and Round Robin testing are complete. A workshop was held at EWI in May 2005 that featured a demonstration of the technologies developed under this program and other technologies developed by EWI's other research and development programs. EWI is reviewing and discussing the draft results with team partners and is compiling the final report.

The major objectives of this program are to:

- Benchmark the performance of current state-of-the-art amplitude based AUT and PA UT inspection systems for pipeline girth weld and repair weld flaw detection and sizing.
- Develop improved 3-D imaging and time-based PA approaches for defect detection and sizing in pipeline girth welds and repair welds.
- Validate the performance of the proposed improvements by laboratory and field tests.
- Develop industry guidance and recommendations on PA AUT of pipeline girth welds.

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